CUBIT Capability Proposal

Technical Area Geometry, Meshing, Infrastructure, GUI, Graphics, etc..	**Technical Lead** Cubit Developer in charge of technical area
Mesh Generation	Mike Borden?

MRD Description
Describe the capability in terms of how a user would see it.

Capabilities for generating hybrid three-dimensional meshes.

SRS Description
What needs to be done by Cubit developers to implement this capability? Break the tasks into steps if applicable. (Steps should be on the order of 2 man-weeks or more)

1. Rejuvenate code for creating Pyramid transitions between Hex-Tet regions. (Ray has written code for this which is in the repository somewhere.)
2. Write algorithms for sweeping triangle and hybrid quadrilateral and triangular meshes.
3. Write algorithms for rotating quadrilateral meshes with a zero length inner radius (creating wedges at the axis of rotation).
4. Automate (1) into an option in AutoScheme so that regions that can not be automatically hex mesh are tetmeshed with a pyramid transition region to the rest of the mesh.
5. (More) quality metrics for pyramids and wedges.
6. Three-Dimensional Smoothing Algorithms for hybrid meshes.
7. Whatever needs to be done for the export codes for these meshes?
8. Write a Pyramid to Tetrahedral conversion tool (PTet).
9. Improved MBG support.

Justification
Describe why this is important and what impact it will have if it is implemented. (or not implemented).

Improve hybrid mesh creation has been requested by several people. The review committee after the IMR suggested we push harder in this area. Other people who have requested this are discussed in Bugs 4991, 2481, 4965. I feel we could start on this work by doing numbers 1, 2, 5, and 7 for the 10.2 release and doing the remaining items for 10.3. This is excellent way to reduce the amount of time spent in the meshing process for people who prefer hexahedral meshes but can use other element types.

Resources Who will work on this	**Time estimate** How much time will it take in man-weeks	**Targeted Release** 10.2 (August 06), 10.3 (March 2007), 10.4 (August 2007), Future (beyond FY07)
Michael Brewer?, Mike Borden?, Ray Meyers?	60 weeks	10.2 and 10.3

Submitted By:	**Date:**
Michael Brewer	3-30-2006